

# Ectopic Infra Orbital Nerves: Case Series of a Dangerous Normal Variant

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## ABSTRAK

*Variasi normal di daerah sinus paranasal terdokumentasi dengan baik pada literatur. Kami menyajikan lima kasus varian normal yang diketahui, yang dapat memiliki implikasi serius bagi pasien dan juga ahli bedah operasi. Kanal saraf infra orbital ektopik pada sinus maksila jarang dijelaskan dalam literatur pencitraan. Terkadang hal ini dianggap septum sederhana di sinus maksila yang dapat mengalami komplikasi serius selama operasi functional endoscopic sinus surgery (FESS). Kami menggambarkan temuan pencitraan dan menyajikan ulasan singkat dari publikasi sebelumnya mengenai topik yang sama.*

**Kata kunci:** saraf infra orbital, pelatihan anomali, functional endoscopic sinus surgery (FESS).

## ABSTRACT

*Normal variations in the paranasal sinus region are well documented in literature. We present five cases of a little known normal variant, which can have serious implications for the patient as well as the operating surgeon. An ectopic infra orbital nerve canal coursing through the maxillary sinus has rarely been described in imaging literature. This may sometimes be mistaken for a simple septum in the maxillary sinus and may cause serious complications during Functional Endoscopic sinus surgery (FESS) surgeries. We describe the imaging findings and present a brief review of the previous publications on the same subject.*

**Keywords:** infra orbital nerve, anomalous course, functional endoscopic sinus surgery (FESS).

## INTRODUCTION

Normal variations in the paranasal sinus region are well known and documented in literature. Recently a lesser-known variation has been reported in which the infra orbital nerve along with its accompanying vessels traversed through the lumen of the maxillary sinus instead of travelling along the lateral wall of the maxillary sinus. The ectopic infra orbital nerve may be avulsed during surgery within the maxillary sinus if the operating surgeon is not aware of the anomalous course. Any injury

to the infra orbital vessels during surgery may result in torrential hemorrhage obscuring the field of view during Functional Endoscopic sinus surgery (FESS). An anomalous course of an infra orbital nerve should be looked for by radiologists during evaluation of patients prior to FESS to prevent catastrophic events. This anomaly has been reported only 4 times earlier in the English language literature in the form of three case reports and one dedicated imaging study.<sup>1-4</sup> We also review the salient features highlighted by the previous publications.

## CASE ILLUSTRATION

### Case 1

A 29-year-old female who had undergone septoplasty few years back complained of persistent headache and pain over the cheeks. She was referred to our center for a computed tomography (CT) of the paranasal sinuses to rule out maxillary sinusitis in view of the complaints. The CT scan was performed on a 64 Slice CT scan in the axial plane and coronal and sagittal reformations were obtained. The infra orbital nerve was seen to course in the inferior wall of the orbit in its initial portion. However, in its distal course the nerve traversed through the lumen of the right maxillary sinus and exited through the inferior wall of the right maxillary sinus. [Figure 1] The infraorbital nerve and the adjoining vessels were covered by a thin barely perceptible bony septum throughout its course. There was no mucosal thickening or polyp in the maxillary sinus and hence the entire nerve and its anomalous course could be well delineated. The left infra orbital nerve followed a normal course within the floor of the left orbit and traversed the lateral wall of the maxillary sinus. The referring surgeon was informed about the imaging findings and he decided to manage it conservatively since the rest of the paranasal sinuses did not show significant mucosal disease.

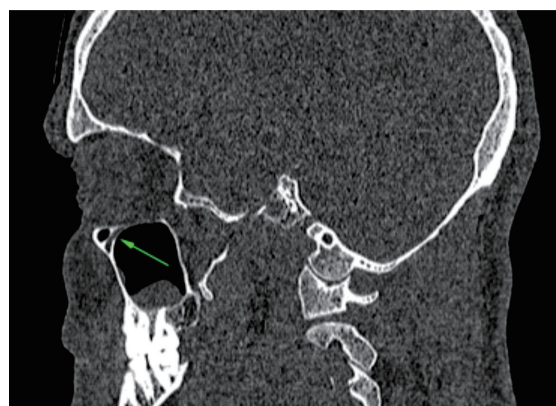


**Figure 1.** Coronal plain CT scan of the paranasal sinuses showing the ION canal traversing the right maxillary sinus.

### Case 2

In another case, a 33-year-old male complaining of persistent headache for a few years was referred to our center for scanning of the brain and the paranasal sinuses. The CT

scan showed mild mucosal thickening in the right maxillary sinus. However, the bilateral osteomeatal units were patent. The bilateral infra orbital nerves followed an anomalous course traversing the maxillary sinus lumen. Both nerves were covered by a bony septum. [Figure 2, 3] He was managed conservatively and was asked to follow up after a course of medication.



**Figure 2.** Sagittal plain CT scan of the paranasal sinuses showing the ION canal traversing the right maxillary sinus.

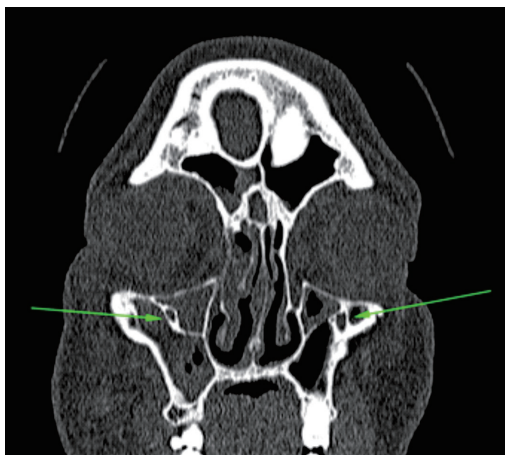


**Figure 3.** Sagittal plain CT scan of the paranasal sinuses showing the ION canal traversing the left maxillary sinus.

### Case 3

A 35 year old male patient presented with headache and pain over the maxillary regions for the last seven days. He complained of stuffiness of nose and difficulty in breathing through the nose resulting in mouth breathing for most part of the day. He had mild fever which would subside temporarily with anti-pyretic agents. He was referred for a CT scan to rule out acute sinusitis. The CT scan revealed polypoidal mucosal thickening in the right maxillary sinus which was

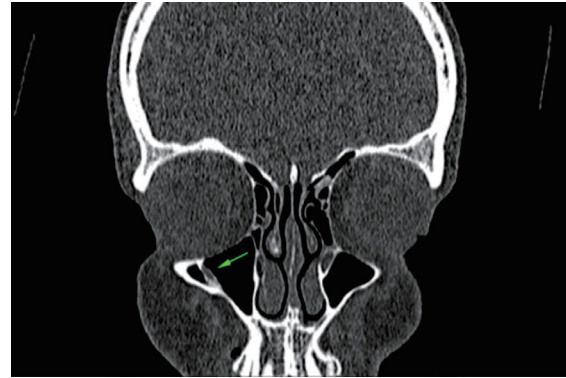
blocking the right osteo meatal unit. Retained secretion with fluid level was also seen in the right maxillary sinus consistent with acute sinusitis. A thin septum was seen in the right maxillary sinus through which the infra orbital nerve was coursing. The septum and the contained infra orbital nerve were encased completely by the polypoidal mucosal thickening. On the left side also the infra orbital nerve followed a similar anomalous intra sinusoidal course. [Figure 4] The concerned surgeon was notified about this aberration and the potential danger of avulsing the nerve if resection of the polyp was attempted. The patient was put on high dose anti biotics and surgery was postponed for a later date keeping in mind the anomalous course of the infra orbital nerve.



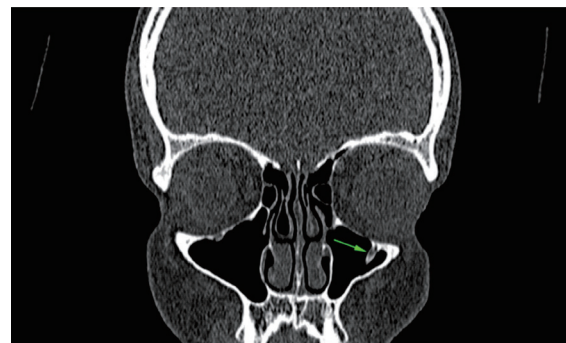
**Figure 4.** Coronal CT scan image showing polypoidal mucosal thickening in the right maxillary sinus. The right ION is traversing the maxillary sinus lumen and is completely encased by the mucosal thickening. Note the left ION traversing the left maxillary sinus.

#### Case 4

A 38 year old female patient presented with persistent frontal headache for the last 2 years which responded intermittently to pain killers. The last episode of head ache was persistent for 15 days and hence the patient was referred for CT scan to rule out frontal sinusitis. The CT scan showed minimal mucosal thickening in bilateral maxillary sinuses with no imaging features of acute sinusitis. The infra orbital nerves bilaterally were seen traversing the maxillary sinus lumen. [Figure 5, 6]



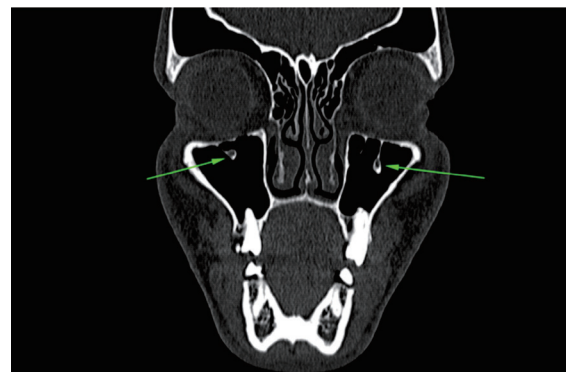
**Figure 5.** Coronal CT scan image showing the right ION traversing the right maxillary sinus



**Figure 6.** Coronal CT scan image showing the left ION traversing the left maxillary sinus lumen.

#### Case 5

A 21 year old male patient complaining of inability to open mouth fully and pain in the bilateral temporal regions was referred for CT scan of bilateral temporo mandibular joints to rule out TM joint osteo arthritis. The anomalous course of infra orbital nerves was incidentally noted in this patient on evaluation of the bone windows. [Figure 7]



**Figure 7.** Coronal CT scan image showing the intra sinusoidal location of bilateral ION



## DISCUSSION

The infra orbital nerve (ION) is a direct continuation of maxillary division of the trigeminal nerve and courses within a canal in the floor of the orbit. It divides into 4 branches (the inferior palpebral, internal nasal, external nasal, and superior labial branches) and supplies the skin and mucous membranes of the middle portions of the face. Accurate knowledge about the course and location of this nerve is of paramount importance for certain maxillofacial surgeries like malignant tumors of the maxillary sinus, tumors of the orbit with involvement of the inferior wall and surgical corrections of the maxillary sinus fracture after trauma. Moreover, iatrogenic injury to the nerve during FESS may have medico legal implications.

The first case of an ectopic infra orbital nerve was reported by Chandra et al<sup>1</sup> in which the infraorbital nerve canal traversed the lumen of the maxillary sinus within the lamella of the infraorbital ethmoid cell rather than coursing within the bone of the orbital floor. The authors highlighted the importance of this finding by a remarking that the nerve would have been at a significant risk of injury during entry into the sinus if a Caldwell Luc procedure was contemplated. The exact course of the ION is also important if a regional anesthetic blockade is planned for a neuropathic facial pain. The location of the ION foramen, accessory foramina and the direction of the infra orbital canal have been studied in detail to aid physicians in image guided or blind procedures directed at the infra orbital nerve.<sup>5,6</sup>

The second case was reported by Mailleux et al<sup>2</sup> and later the third one by Elnil H et al<sup>3</sup>. Mailleux et al<sup>2</sup> reported 2 cases, one of them which showed an anomalous course of ION bilaterally. Elnil H et al<sup>3</sup> reported a single case with bilateral anomalous course of ION.

After the initial case few reports increased the awareness about this potentially dangerous variant, Ference et al<sup>4</sup> reviewed 100 consecutive

CT scans of the paranasal sinus region to estimate the incidence of variations in the course of the infra orbital nerve. They found that 60.5% of the nerves were confined within the roof of the maxillary sinus, in 27% cases the canal descended below the roof of the maxillary sinus but remained juxtaposed to it and in 12.5% cases the ION descended into the maxillary sinus lumen. They also observed that descent of the ION canal into the maxillary sinus was more common in the setting of an ipsilateral infra orbital ethmoid cell.

## CONCLUSION

An anomalous course of the infra orbital nerve canal is a lesser-known but important normal variant. A pre operative knowledge of this variant can help a surgeon in preventing injuries to the infra orbital nerve and vessels during FESS surgeries. Radiologists should be aware of this normal variant and include it in the protocol for evaluation of paranasal sinus scan studies prior to FESS.

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